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METHOD AND DEVICE FOR APPLYING AN ADHESIVE

Inventors: Hans-Jürgen Meißner
21337 Lüneburg, Germany

Jürgen Steckelberg
21354 Bleckede, Germany

Georg Gillesen
52072 Aachen, Germany

Applicant: Nordson Corp.
Westlake, Ohio, USA

Agent: Eisenführ, Speiser & Partner
28195 Bremen, Germany

Documents Cited: DE 34 19 867 C1
DE 23 50 617 B2
DE-AS 19 49 786
DE 23 65 532 A1
DE 21 45 705 A1
DD 1 05 766
CH 6 42 872
Herrmann, H.:
Hotmelt-Beschichtung/Silikonisieren
[Hot melt coating/siliconizing]. In:

Coating 2/79, pp. 26, 28-32;
JP 4-330964 A. In: Patent
Abstracts of Japan. C-1044, April 2,
1993, Vol. 17, No. 171.

The following statements are taken [unedited] from the documents submitted by the applicant.

[Abstract]

The present invention relates to a method for applying an adhesive to an application surface in which the adhesive is first transferred by means of an application roller from a reservoir to elevations of the circumferential area of a transfer roller and from there to the application surface, which method is characterized in that the adhesive used is a hot-melt adhesive, that the application roller and the transfer roller are heated, that the temperature of the application roller is set to a temperature appropriate for applying the hot-melt adhesive, and that the temperature of the transfer roller is set to a slightly lower value.

The present invention also relates to a device for applying an adhesive to an application surface which is especially suitable for carrying out the method according to the present invention, with a reservoir for the adhesive, an application roller and a transfer roller, with the application roller being partially immersed in the adhesive reservoir and with the transfer roller having elevations disposed on its circumferential area, which elevations touch the circumferential area of the application roller, on the one hand, and the application surface, on the other hand, and with the application roller and the transfer roller of the device being heatable and adjustable to different temperatures.

Description

The present invention relates to a method for applying an adhesive to an application surface in which the adhesive is first transferred by means of an application roller from a reservoir to elevations of the circumferential area of a transfer roller and from there to the application surface as well as to a device, in particular for carrying out the method according to the present invention, with a reservoir for the adhesive, an application roller and a transfer roller, with the application roller being partially immersed in the adhesive reservoir and with the transfer roller having elevations disposed on its circumferential area, which elevations touch the circumferential area of the application roller, on the one hand, and the application surface, on the other hand.

Just as there are many different types of adhesives, there are also many different methods and devices for processing adhesives. One characteristic that all types of adhesives have in

common is that only the combination of an adhesive with a method for its processing provides decisive information about the quality of the application: if improperly processed, an otherwise suitable adhesive can lead to unusable results.

For some applications, e.g., the manufacture of envelopes, the adhesive is first applied to certain parts of the surface of film or paper webs. The film or paper webs are subsequently cut into individual sections, such as are required for an envelope, which sections are already coated with an adhesive in the appropriate places. Thus, when two surfaces are to be attached to each other by means of the adhesive, e.g., after folding the envelopes, the adhesive is activated, e.g., by applying a solvent, such as water, to it. For the application of an adhesive that is dissolved in water or another solvent, a gravure printing method, among other things, is used, in which the dissolved adhesive is first transferred by means of an application roller from a reservoir to elevations of the circumferential area of a transfer roller and from there to the paper or film web. A serious disadvantage of such a method is that the dissolved adhesives can cause the paper or film web to warp and/or to form wrinkles: in particular narrow areas free from the adhesive that are located between adhesive-coated areas are especially affected, which has the effect that it is not always possible to set the space between the adhesive-coated areas to small values without entailing quality losses. The same applies to spaces between the adhesive-coated areas and the adjacent edge of a substrate.

Thus, the problem to be solved by the present invention is to make available a method and a device of the type mentioned above for applying an adhesive in which the prior-art disadvantages mentioned are avoided and which make it possible to manufacture even very narrow areas that are free from adhesive between two glue lines or the edge of a material that is to be coated with an adhesive and the glue line thereof.

The problem is solved by a method in which the adhesive used is a hot-melt adhesive, in which the application roller and the transfer roller are heated, in which the temperature of the application roller is adjusted to a temperature appropriate for applying the hot-melt adhesive and in which the temperature of the transfer roller is set to a slightly lower value.

Even the use of a hot-melt adhesive for application on application surfaces alone entails decisive advantages over prior art: the hot-melt adhesive dries rapidly and without giving off solvent fumes. Therefore, the paper or film web onto which the adhesive is applied does not warp or wrinkle under any circumstances. In addition, later on, for example, when letters are closed, there is no need for the adhesive to be reactivated by the addition of solvents, such as water; two surfaces are glued to each other simply by pressing them together with heat input. Thus, the use of a hot-melt adhesive has considerable advantages both during the application of the adhesive and during the adhesive bonding itself.

When combined with the other features that characterize the present invention, additional advantages are obtained: the hot-melt adhesive can be applied to very sharply circumscribed portions of the application surface. In this manner, it is possible to keep practically even the narrowest portions of the application surface between the adhesive-coated surfaces free from the adhesive. For the production of envelopes, for example, this means that the adhesive tabs of the envelopes can be positioned in a fanlike manner on top of each other and that the adhesive-coated surfaces are always accurately positioned on an adhesive tab and that only in the transition zone from one adhesive tab to the next adhesive tab, a narrow area that is completely free from the adhesive remains. This advantage has so far not been offered by any method used for applying hot-melt adhesives. Furthermore, the application of a hot-melt adhesive by means of a transfer roller has the advantage that the transfer roller can be relatively easily exchanged for a different transfer roller with a different diameter, which makes it possible to obtain any space desired between the repeating adhesive patterns on the paper of the film web.

To solve the problem, the invention also proposes a device of the type mentioned above for applying an adhesive to an application surface-in particular, to carry out the method according to the present invention-in which the application roller and the transfer roller can be heated and can be set to different temperatures.

Since the application roller and the transfer roller of the device according to the present invention can be heated and can be set to different temperatures, this device makes it possible to use a great many different types of hot-melt adhesives for the most varied applications in the advantageous way described above.

In one useful embodiment of the present invention, the surface of the application roller is composed of polished steel. Once such an application roller has reached the correct temperature as claimed in Claim 1, it uniformly picks up the hot-melt adhesive and transfers it easily to the transfer roller.

In one model variant of the device, the surface of the transfer roller is siliconized. A siliconized surface of the transfer roller in combination with the polished steel surface of the application roller ensures that the transfer roller, on its elevations, uniformly picks up the hot-melt adhesive from the application roller and subsequently transfers the hot-melt adhesive reliably to the application surface.

The invention will subsequently be explained in greater detail on the basis of a practical example. The figure shows:

A lateral view of a device according to the present invention for carrying out the method according to the present invention.

Device 10 is surrounded by an enclosure 12 which comprises a reservoir 14 for the liquid hot-melt adhesive. An application roller 16, the longitudinal axis of which is horizontally

supported by enclosure 12, is partly immersed in reservoir 14. Above application roller 16, a transfer roller 18, the longitudinal axis of which runs parallel to the longitudinal axis of application roller 16, is pivotally attached. The circumferential area of transfer roller 18 has elevations which, when transfer roller 18 is in the appropriate rotational position, make contact with or extend to the immediate vicinity of the circumferential area of application roller 16. With adjustable pressure, the elevations of transfer roller 18, however, do not only touch the circumferential area of application roller 16, but also the application surface of a paper or film web 20 which passes between transfer roller 18 and a preferably adjustable counter pressure roller 22. The longitudinal axis of counter pressure roller 22 runs parallel to the longitudinal axes of transfer roller 18 and application roller 16. In the transporting direction of paper web 20 upstream and downstream of transfer roller 18 and counter pressure roller 22, guide rolls 24 and 26 are disposed. Not shown are a dispensing reel for paper or film web 20 and a device for further processing the adhesive-coated paper or film web 20.

When device 10 is in use, reservoir 14 in enclosure 12 is at least partially filled with melted hot-melt adhesive. Application roller 16 rotates in this hot-melt adhesive bath and, on its surface, picks up a film of hot-melt adhesive, the thickness of which film is adjustable, from the reservoir. Above application roller 16, transfer roller 18 rotates parallel to and at the same circumferential speed as application roller 16. One after the other of the elevations on the circumferential area of transfer roller 18 make contact with the hot-melt adhesive that is adhering to the surface of application roller 16 and pick up at least some of it from the surface of application roller 16. Subsequently, the liquid hot-melt adhesive adheres to the elevations of the circumferential area of transfer roller 18 until the elevations make contact with paper or film web 20 which is guided past transfer roller 18 at the circumferential speed of said roller. The liquid hot-melt adhesive is then transferred from the elevations of the circumferential area of transfer roller 18 to the application surface of paper or film web 20. Counter pressure roller 22, which also rotates at the circumferential speed of transfer roller 18 and in the opposite direction thereto, provides the necessary counter pressure.

Since liquid hot-melt adhesive is continuously transferred from reservoir 14 via application roller 16 and from transfer roller 18 to the application surface of paper or film web 20, reservoir 14 must be continuously replenished with a hot-melt adhesive supply. Both reservoir 14 and application roller 16 are heated, preferably with oil. The temperature of the hot-melt adhesive in reservoir 14 corresponds to the application temperature of the hot-melt adhesive specified by the manufacturer. To ensure that the hot-melt adhesive is reliably transferred from application roller 16 to transfer roller 18, the surface of transfer roller 18, which is also heated, has a temperature that is slightly lower than the temperature of the surface of application roller 16. As a result, the viscosity of the hot-melt adhesive on transfer roller 18 is, as

a rule, slightly higher than that in reservoir 14 and on application roller 16. In addition, a reliable transfer of the hot-melt adhesive from application roller 16 to transfer roller 18 is further enhanced by the combination of the surface materials of the two rollers: the circumferential surface of application roller 16 is composed of polished steel, and the surface at least of the elevations on the circumferential area of transfer roller 18 is siliconized. The siliconized surfaces of the elevations of transfer roller 18 do not only contribute to the reliable pickup of hot-melt adhesive from the circumferential area of application roller 16, but also to the reliable delivery of hot-melt adhesive onto the application surface of paper or film web 20.

Transfer roller 18 can be exchanged for other transfer rollers with different diameters so as to be able to obtain any space between repeating printing patterns. The reason is that the circumferential area of each transfer roller can be divided only into an integral number of segments, each of which carries one plate for each application pattern. The removal of one plate relative to the next one on the circumferential area of transfer roller 18 corresponds to the space between the repeating application patterns on the application surface of paper or film web 20. By using transfer rollers of different diameters, the space between the applications patterns on paper or film web 20 can be arbitrarily selected when the circumferential area of a transfer roller is divided by an integral number. If a transfer roller is exchanged for one with a different diameter, the speeds of application roller 16 and transfer roller 18 and of counter pressure roller 22 must be adjusted to one another to ensure that the circumferential speeds of all three rollers are the same.

Finally, the space between the center lines of application roller 16 and transfer roller 18 can be minutely adjusted. In this manner, it can be determined whether the elevations of the circumferential area of transfer roller 18 touch the hot-melt adhesive film only on the surface of the circumferential area of application roller 16 or whether the elevations of the circumferential area of transfer roller 18 dip into this hot-melt adhesive film and thus maybe also touch the circumferential area of application roller 16.

Claims

1. A method for applying an adhesive to an application surface in which the adhesive is first transferred by means of an application roller from a reservoir to elevations on the circumferential area of a transfer roller and from there to the application surface, characterized in that the adhesive used is a hot-melt adhesive, that the application roller (16) and the transfer roller (18) are heated, that the temperature of the application roller (16) is set to a temperature appropriate for applying the hot-melt adhesive, and that the temperature of the transfer roller (18) is set to a slightly lower value.

2. A device for applying an adhesive to an application surface, in particular for carrying out the method as claimed in Claim 1, with a reservoir for the adhesive, an application roller, and

a transfer roller, with the application roller being partially immersed in the adhesive reservoir and with the transfer roller having elevations disposed on its circumferential area, which elevations touch the circumferential area of the application roller, on the one hand, and the application surface, on the other hand, characterized in that the application roller (16) and the transfer roller (18) can be heated and can be set to different temperatures.

3. The device as claimed in Claim 2, characterized in that the surface of the application roller (16) is composed of polished steel.

4. The device as claimed in Claim 2 or, in particular, as claimed in Claim 3, characterized in that the surface of the transfer roller (18) is siliconized.

Includes 1 page of drawings

